(**Adopted:** 06/22/94)

RULE 1117
Graphic Arts

(A) General

(1) Purpose: To reduce emissions of volatile organic compounds (VOC) from packaging rotogravure, publication rotogravure, and flexographic printing operations.

(2) Applicability. The provisions of this rule apply to:

(a) Any packaging rotogravure, publication rotogravure, or flexographic printing operation.

(b) Any person who manufactures any ink, coating, or adhesive containing VOC which is sold, offered for sale, or supplied for use in packaging rotogravure, publication rotogravure, or flexographic printing operations in the District.

(B) Definitions

For the purposes of this rule, the following definitions shall apply:

(1) "Coating": A thin layer of material applied to a substrate in a relatively unbroken film.

(2) "Exempt Compounds": Any of the following compounds:
methane,
carbon monoxide,
carbon dioxide,
carbonic acid,
metallic carbides or carbonates,
ammonium carbonate,
1,1,1-trichloroethane,
methylene chloride,
trichlorofluoromethane (CFC-11),
dichlorodifluoromethane (CFC-12),
chlorodifluoromethane (HCFC-22),
trifluoromethane (HFC-23),
1,1,1-trichloro-2,2,2-trifluoroethane (CFC-113),

1-chloro-1,1-difluoro-2-chloro-2,2-difluoroethane (CFC-114),
chloropentafluoroethane (CFC-115),
2,2-dichloro-1,1,1-trifluoroethane (HCFC-123),
2-chloro-1,1,1,2-tetrafluoroethane (HCFC-124),
pentafluoroethane (HFC-125),
1,1,2,2-tetrafluoroethane (HFC-134),
1,1,1,2-tetrafluoroethane (HFC-134a),
1,1-dichloro-1-fluoroethane (HCFC-141b),
1-chloro-1,1-difluoroethane (HCFC-142b),
1,1,1-trifluoroethane (HFC-143a),
1,1-difluoroethane (HFC-152a),

and the following four classes of perfluorocarbon (PFC) compounds:

(i) cyclic, branched, or linear, completely fluorinated alkanes,
(ii) cyclic, branched, or linear, completely fluorinated ethers with no unsaturations,
(iii) cyclic, branched, or linear, completely fluorinated tertiary amines with no unsaturations, and
(iv) saturated perfluorocarbons containing sulfur with sulfur bonds only to carbon and fluorine.

(3) "Flexographic Printing": The application of words, designs, or pictures by roll printing technique in which the pattern to be applied is raised above the printing roll and the image carrier is made of rubber or other elastomeric material.

(4) "Fugitive Emissions": Uncollected emissions of VOC from any portion of the printing, coat or laminating operation.

(5) "Grams of VOC per Liter of Coating (or Ink or Adhesive), Excluding Water and Exempt Compounds" (VOC Content): The weight of VOCs emitted during use, coating, curing or drying per combined volume of VOC and coating (or ink or adhesive) solids and can be calculated by the following equation:

$$\frac{\text{Grams VOC}_{\text{(less water \& exempt compounds)}}}{\text{Liter of Coating}} = \frac{W_s - W_w - W_{es}}{V_m - V_w - V_{es}}$$

Where:
W_s = weight of volatile compounds in grams
W_w = weight of water in grams
W_{es} = weight of exempt compounds in grams
V_m = volume of material in liters
V_w = volume of water in liters
V_{es} = volume of exempt compounds in liters

(6) "Gravure Printing": An intaglio printing operation in which the ink is transferred from minute etched wells on a plate to the substrate, which is supported by an impression roller, with excess ink removed by a doctor blade.

(7) "Ink Additive": That solvent which is added to printing inks to reduce viscosity.

(8) "Lamination": A process of bonding two or more layers of material to form a single multiple layer sheet by using an adhesive.

(9) "Letterpress printing": A printing method where the image area is raised relative to the nonimage area and the ink is transferred to the paper directly from the image surface.

(10) "Lithographic printing": Printing by a planographic method in which the image and nonimage areas are on the same plane.

(11) "Offset Lithographic Printing": A planographic method in which the image and nonimage areas are on the same plane and where the ink is transferred from an image plate on one cylinder to an image blanket on a different cylinder. The ink is finally transferred from the image blanket to the surface to be printed.

(12) "Oven": A heating chamber which uses heat, ultraviolet (UV) radiation, or electron beam (EB) radiation to bake, cure, polymerize, or dry a surface coating.

(13) "Packaging Gravure": Gravure printing on paper, paperboard, foil, film or other substrates which are to be used to produce containers or packages.

(14) "Pantone Color": A printing ink created for color matching by combination of process inks.

(15) "Printing Ink": Any fluid or viscous composition used in printing, impressing, or transferring an image onto a substrate.

(16) "Process Ink": The hues yellow, magenta, and cyan, plus black used in the four-color print process.

(17) "Publication rotogravure": Gravure printing on paper which is subsequently formed into books, magazines, catalogues, brochures, directories, newspaper supplements or other types of printed material.

(18) "Screen Printing": A process where the printing ink passes through a web or a fabric to which a refined form of stencil has been applied. The stencil openings determine the form and dimensions of the imprint.

(19) "Volatile Organic Compounds (VOCs)": Any compound containing at least one atom of carbon, except exempt organic compounds.

(C) Requirements

(1) No packaging rotogravure, publication rotogravure, or flexographic printing operation shall use any inks, coatings, or adhesives unless the grams of VOC per liter of coating (or ink or adhesive), excluding water and exempt Compounds, **as applied**, is less than 300 grams per liter (2.5 lbs/gallon).

(2) In lieu of the requirements of Subsection (C)(1), emissions of VOC may be controlled by an emission capture and control system, which reduces VOC emissions to the atmosphere, provided that:

(a) Averaged over any period of continuous operation not to exceed 24 hours, the control device reduces the VOC emissions delivered from the capture system to the control device by at least 90 percent, by weight; and,

(b) Averaged over any period of continuous operation not to exceed 24 hours, the combined effects of the capture and control system shall provide an overall emission reduction efficiency of at least:

(i) 75 percent, by weight, for publication rotogravure, or

(ii) 65 percent, by weight, for packaging rotogravure, or

(iii) 60 percent, by weight, for flexographic printing operations; and,

(c) The collection system shall vent all drying oven exhaust to the control device and shall have one or more inlets for collection of fugitive emissions; and,

(d) During any period of operation of a thermal incinerator, combustion temperature shall be continuously monitored; and,

(e) During any period of operation of a catalytic incinerator, exhaust gas temperature shall be continuously monitored; and,

(f) Appropriate permit(s) for the emission capture and control system are obtained pursuant to District regulations.

(3) Materials containing VOCs shall be stored in nonabsorbent, nonleaking containers, which shall be kept closed except when adding or removing material or during cleaning operations.

(4) VOC material wastes (including but not limited to liquid wastes, rags, and packaging) shall be disposed of in a manner consistent with Federal, State, and local hazardous waste regulations.

(5) The manufacturer of any ink, coating, or adhesive which is sold, offered for sale, or supplied for use in packaging rotogravure, publication rotogravure, or flexographic printing operations in the District shall include the following information on the product container or a data sheet supplied with the product:

(a) Material name, manufacturer identification, specific mixing instructions, and VOC content, as applied.

(b) The VOC content of inks, coatings, and adhesives expressed as defined in Subsection (B)(5).

(D) Exemptions

(1) The requirements of Subsections (C)(1) and (C)(2) shall not apply to graphic arts facilities which emit less than 2500 pounds of VOC in any month from printing, coating, and adhesive operations. Once a facility becomes subject to Subsections (C)(1) and (C)(2) by exceeding this threshold, it will remain subject to these provisions even if its emissions later fall below the applicability threshold.

(2) Screen Printing.

(3) Letterpress Printing.

(4) Lithographic Printing.

(E) Monitoring and Records

Unless otherwise noted, all VOC content and density values recorded pursuant to the requirements of this rule shall be for the material **as applied**. Packaging rotogravure, publication rotogravure, and flexographic printing operations subject to this rule shall maintain the following records and information:

(1) For each ink, coating, and adhesive in use and in storage:

(a) a data sheet or material list giving material name, manufacturer identification, specific mixing instructions; and

(b) VOC content as applied.

(2) If only inks, coatings, and adhesives meeting the specification found in Subsection (C)(1) are used:

(a) Records on a daily basis showing the amount of ink used. Ink use records shall be maintained using one of the following options:

(i) Group the quantity of all inks used and note the highest VOC content figure and the lowest density figure from all the inks.
(ii) Itemize each ink and pantone color and use the specific VOC content and density value for each.

(b) Records on a daily basis showing the amount of coatings and adhesives used. Itemize each coating and adhesive and use the specific VOC content and density value for each.

(3) If inks, coatings, or adhesives which do not meet the specifications found in Subsection (C)(1) are used and compliance is achieved through the use of add-on emission control equipment:

(a) Records on a daily basis showing the type and amount of inks, coatings, and adhesives used. Such records shall itemize each ink, coating, and adhesive using the specific VOC content and density value for each.

(b) Daily records of key system operating and maintenance parameters which will demonstrate continuous operation and compliance of the emission control device during periods of emission producing activities. Key system operating parameters are those necessary to ensure compliance with VOC capture and control requirements (including but not limited to temperatures, pressures, and flow rates). Such records shall be kept in the form and manner as prescribed by the APCO.

(4) If the facility is claiming exempt status pursuant to Subsection (D)(1), the facility shall maintain adequate records on a monthly basis to demonstrate the exempt status.

(5) Any record required or produced pursuant to this rule shall be retained on site for a minimum of five years and shall be made available to the APCO upon request.

(F) Test Methods

(1) Measurement of the VOC content of inks, coatings, and adhesives, except as specified in subsection (F)(2), shall be conducted and reported in accordance with EPA Reference Method 24 and ARB Method 432 for determination of exempt compounds as necessary. Perfluorocarbon compounds shall be assumed to be absent from a product or process unless a manufacturer or facility operator

identifies the specific individual compounds (from the broad classes of perfluorocarbon compounds) and the amounts present in the product or process and identifies a validated test method which can be used to quantify the specific compounds.

(2) Measurement of the VOC content of publication rotogravure inks shall be conducted and reported in accordance with EPA Reference Method 24A and ARB Method 432 for determination of exempt compounds as necessary.

(3) Emissions of VOC as specified in Subsection (C)(2) shall be measured as prescribed by either EPA Reference Method 25 or EPA Reference Method 25A, for determining organic emissions, and EPA Reference Method 18, for quantifying emissions of exempt compounds.

(4) The capture and control efficiency of air pollution control equipment, as specified in Subsection (C)(2), shall be determined using applicable methods in 40 CFR 52.741.

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